

## INTERESTED?

The *Design Guidelines* provides valuable information on modular skylight systems. The new photometric files predict lighting characteristics of skylights and light-wells.

Who will benefit from this research?

- Commercial building owners who want to exploit the energy savings potential of skylights
- Building designers and contractors looking for more effective ways to integrate skylights with T-bar ceilings
- Manufacturers of skylights and ceiling-system products who want to expand their markets and enhance their products

Key next steps include:

- *Building owners/managers:* Look for opportunities to include skylights in new and retrofit construction projects. Check with utility companies for efficiency program information.
- *Building designers/contractors:* Use the information in the *Design Guidelines* to design and build skylight/light-well systems.
- *Skylight & ceiling-system manufacturers:* Explore opportunities for expanding market share, including developing modular skylight/light-well systems.
- *Lighting software developers:* Include the PIER photometric results in product updates.

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# INTEGRATED DESIGN OF COMMERCIAL BUILDING CEILING SYSTEMS



EFFECTIVE  
SKYLIGHTING WITH  
T-BAR CEILINGS



## REMOVING BARRIERS TO EFFECTIVE SKYLIGHTING

Low-rise commercial buildings that can take advantage of skylights with suspended ceiling systems (T-bar and acoustical tile) include offices, retail spaces, grocery stores and schools. Illuminating these buildings with skylights offers dramatic potential for saving lighting and cooling energy.

Skylighting isn't widely used, however, because it requires careful integration of equipment and components from many different manufacturers. But now—as a result of this project—data, research protocols, and *Design Guidelines* are available to help remove many of the barriers to effective skylighting.



*Approximately 75% of new retail construction uses dropped ceiling systems*

To create the *Design Guidelines*, the researchers developed new test protocols and conducted tests on common skylight and light-well combinations. They performed testing activities for U-factor, solar heat gain coefficient (SHGC), and visible transmittance, and developed extensive photometric data.

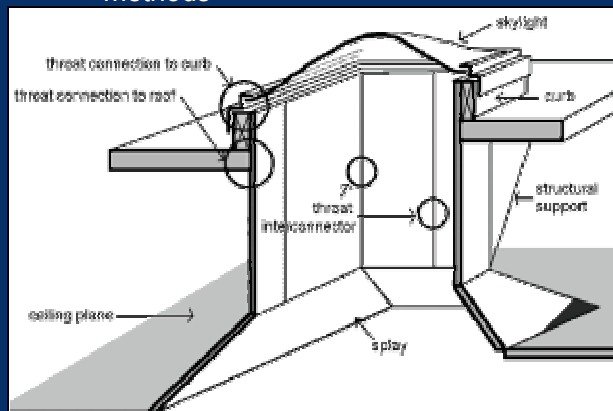
## DESIGN GUIDELINES FOR SKYLIGHTS WITH SUSPENDED CEILINGS

***THESE DESIGN GUIDELINES PROVIDE TOOLS FOR THE EFFECTIVE USE OF SKYLIGHTS WITH SUSPENDED CEILINGS. KEY STRATEGIES INCLUDE:***

- Use two-part light wells with throat and splays to reduce the number of skylights, improve lighting uniformity, and increase design flexibility
- Develop modular skylight/light-well products, including standardized interconnectors between skylights and ceilings

***THE RESEARCHERS ALSO TESTED SKYLIGHTS FOR LIGHT TRANSMITTANCE, HEAT TRANSFER, AND SOLAR GAINS, WITH THESE KEY RESULTS:***

- Photometric data are now available for skylight systems
- Light wells reduce solar heat gains
- New data on effective visible transmittance and U-factor will likely influence skylight rating and simulation methods



*Standardized interface techniques will cut costs and speed up design and installation*

## ENERGY SAVINGS AND BETTER DESIGN TOOLS

Lighting designers and software developers now have the same predictive tools for designing with skylights as they do for electric lighting. These tools allow for more accurate and confident designs, easing the use of skylights.



*The Design Guidelines can help building owners reap the benefits of daylighting*

Following the best practices in the *Design Guidelines* will result in skylight/light-well systems that provide optimal energy performance and superior lighting quality. The *Design Guidelines* are applicable to about 16.5 million square feet per year of California's commercial building construction. Assuming that 10% of this market follows the recommendations in the first year, with a 1% per year increase of market penetration over the next 10 years, statewide energy savings would be:

- First-year electricity savings: 1,614 MWh; cumulative electricity savings: 115,429 MWh.
- Cost savings over 10 years: \$16 million.